The Files

13 August 1954

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U. S. Navy Infrared Development - Trip Report

1. A visit was made to the Underwater Sound Laboratory, New London, Connecticut, 6 August 1954 to discuss infrared development activities with respect to voice and CW communication devices.

2. Specific interests concerned the development of a cesium vapor transmitting tube and an inquiry regarding evaluation tests and reports of recently completed infrared communication systems.

a) The cesium vapor tube was in an intermediate stage of development under a BuShips contract to Westinghouse Electric one year ago. The work was being performed by Dr. Beese of that Company and the Underwater Sound Laboratory was to provide the systems engineering (packaging). OC-E's interest in the cesium vapor tube arose from the high efficiency that may be realized with electrical modification. (A tungsten light source requires high filament current and modulation is accomplished mechanically with low efficiency.)

3. Those present for a discussion of infrared equipment were:

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Mr. Robert Mitchell	USL
Mr. Harold Bishop	USL

a) Dr. G. M. Milligan, the infrared chief, was absent due to illness. It was anticipated that Dr. Milligan would be present for the forthcoming tests, (see below.)

4. Development work on the cesium transmitting tube ceased some eight months ago because Dr. Beese was diverted to higher priority work and simultaneously, activity at the laboratory was concentrated on electronic work associated with their atomic submarine. However, this cesium vapor tube development with Westinghouse and Dr. Beese is being reactivated by BuShips. Because the application of a tube coating involves an explosion hazard, Westinghouse is currently looking for a subcontractor to perform this operation. The AN/SAC 4, an infrared transceiver, has a cesium vapor transmitting tube and will be among the equipment to be evaluated in the forthcoming tests.

5. Tests of all available infrared equipment are to be conducted during the period 16 - 19 August 1954 at the Underwater Sound Laboratory. It was stated that Mr. Don Carver, BuShips, Code 853 and Joseph H. Hannigan, Code 964B would be present for these formal tests.

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6. The following equipment was viewed and discussed briefly:

a) AN/SAC-4

The AN/SAC-4 is a 50 watt infrared transceiver capable of voice and CW modulation. It is intended for shipboard installation and weighs in excess of 100 pounds. The transmitting source is cesium vapor. The operating range was estimated at 10,000 yards and is powered by 115 volts, 60 cycles and 120 volts DC.

b) AN/PAC-1

The AN/PAC-1 is a portable infrared voice system. The viewer has a diameter of 4 ½" and a beam width of 10 degrees. The tungsten transmitting tube is mechanically modulated and has a diameter of 4½" and a beam width of 4 degrees. The operating range for two AN/PAC-1 units was estimated at 5,500 yards. The viewer and transmitter are mounted in a vertical plane in a magnesium housing and weigh 14.5 pounds. The power supply is separate and consists of three Willard rechargeable batteries and a 90 bolt dry cell. The power supply weighs approximately 17 pounds. The equipment may be operated from the shoulder although a tri-pod mount is provided. An instruction manual has been prepared and is available (NAVSHIPS 92080 - CONFIDENTIAL).

c) AN/UAT-1

The AN/UAT-1 is a 35 watt omidirectional transmitter beacon used in conjunction with the AN/PAR-2 Swimmers Helmet. This unit was not available.

d) AN/PAR-1

The PAR-1 is a voice and CW infrared receiver intended for use in a small boat. The dimensions of this unit are approximately 12" X 12" X 3½". This unit was the receiving device used in conjunction with a demonstration of the AN/PAC-1.

e) PAR-2

A pre-production model of the AN/PAR-2 was available. This unit is an infrared receiver that is worn on the head of a swimmer and nicknames "Beanie". (A technical manual is available as NAVSHIPS 31037 - CONFIDENTIAL).

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f) The AN/PAC-1 is the U. S. version of the German LICHTSPRECHER, a 1957 model of which was seen at the U.K. This equipment is described by W. S. Ehrford and J. R. Platt in the Journal of Opticians Society of America, Volume 38, No. 3, Pages 253 to 260. Reprints may be obtained from the American Institute of Physics, 57 East 55th Street, New York 22, New York.

g) Mr. Bishop had designed a infrared receiver of miniaturized dimensions to be worn on the wrist. This unit measured approximately 1½" X 1" X 3/8", and consisted of a three subminiature tube hearing aid amplifier and photo transistor. The battery power supply is carried in a pocket. This gadget could be transistorized and the employment of optics would increase its range.

h) A recently developed communications device for swimmers was described. This equipment consists of a transducer and amplifier, about the size of a package of cigarettes, headphones and a lip microphone. It was explained that the normal maximum range of communication between waterborn swimmers is 20 by shouting but that swimmers intercommunication range was extended to 200 feet with the unit which is referred to as the "Buddy Phone". Nomenclature has not been assigned.

3. Demonstration

The AN/PAC-1 was set up in a small auditorium and the transmitted beam was bounced off the back of the furthermost seat. Voice communication was received with the PAR-1 and the wrist receiver. Reception was excellent, the range was approximately 120 feet. (i.e. the equipment worked.)

4. Considerable additional information was gained on infrared techniques and the feasibility of developing equipment of reduced dimensions for agent communication with a 2½ mile maximum range is indicated. A report on these talks will be left to a future report in the interests of disseminating information regarding the formal tests during the week of 16 August.

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